<u>Session 16   Assignment 1 Question</u>

Problem Statement 1:

A test is conducted which is consisting of 20 MCQs (multiple choices questions) with every MCQ having its four options out of which only one is correct. Determine the probability that a person undertaking that test has answered exactly 5 questions wrong.

<u>Solution:</u>

$n = 20$, $n - k = 5$, $k = 20 - 5 = 15$

The probability of success = probability of giving a right answer = s = $\frac{1}{4}$

Hence, the probability of failure = probability of giving a wrong answer = 1 - s

$= 1 - \frac{1}{4} = \frac{3}{4}$

When we substitute these values in the formula for Binomial distribution we get,

So, P (exactly 5 out of 20 answers incorrect) = C (20, 5) * $(\frac{1}{4})^{15} * (\frac{3}{4})^{5}$

P (5 out of 20) = $\frac{(20*19*18*17*16)}{(5*4*3*2*1)} * (\frac{1}{4})^{15} * (\frac{3}{4})^{5}$

= 0.0000034 (approximately)

Thus the required probability is 0.0000034 approximately.

Problem Statement 2:

A die marked A to E is rolled 50 times. Find the probability of getting a "D" exactly 5 times.

Solution:

n = 50, k = 5, n - k = 4/5.

The probability of success = probability of getting a "D"= s = 1/5

Hence, the probability of failure = probability of not getting a "D" = 1 - s = 4/5.

Problem Statement 3:

Two balls are drawn at random in succession without replacement from an urn containing 4 red balls and 6 black balls.

Find the probabilities of all the possible outcomes.

Solution:

First determine the probabilities of the events.

Events	**Probability**
RR	(4/10)(3/9) = 2/15
RB	(4/10)(6/9) = 4/15
BR	(6/10)(4/9) = 4/15
BB	(6/10)(5/9) = 1/3

The probability of 0 black balls (RR)is 2/15

The probability of 1 black ball is (RB or BR) is 4/15+4/15 = 8/15

The probability of 2 black balls (BB) is 1/3

If Z is the random variable representing the number black balls. The probability distribution will be :

Z	P(z)
0	**2/15**
1	**8/15**
2	**1/3**

Notice that the sum of the probabilities = 2/15+8/15+1/3 = 1